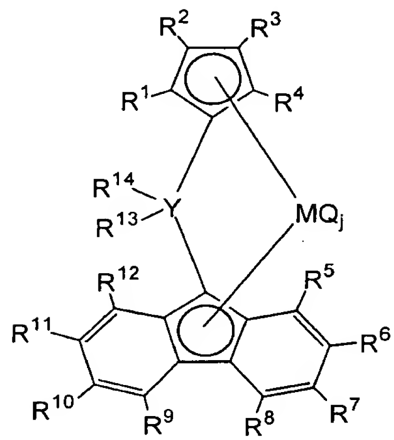
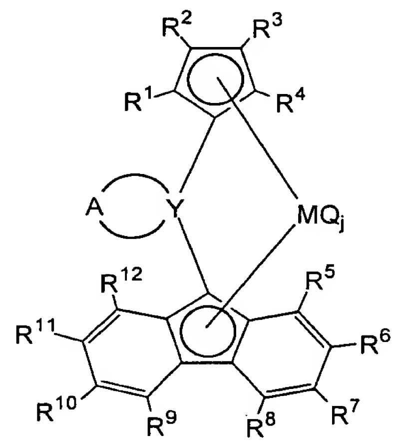
What is claimed is:

1. A metallocene compound represented by the following formula (1) or (2):



...(1)

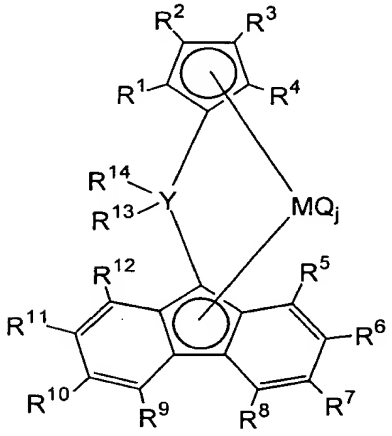


...(2)

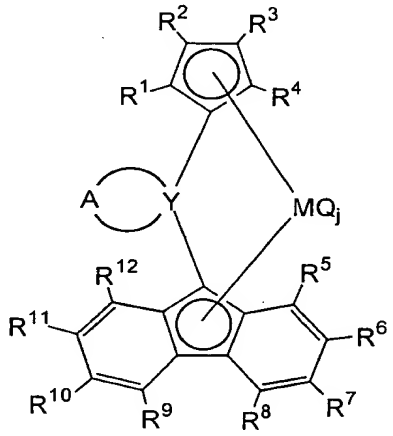
wherein R^3 is selected from a hydrocarbon group and a silicon-containing hydrocarbon group; R^1, R^2, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13} and R^{14} may be the same or different and are each selected from a hydrogen atom, a hydrocarbon group and a silicon-containing hydrocarbon group; of the groups indicated by R^1 to R^{12}, neighboring groups may be bonded to form a ring; in case of the formula (1), a group selected from R^1, R^4, R^5 and R^{12} may be bonded to R^{13} or R^{14} to form a ring; A is a divalent hydrocarbon group of 2 to 20 carbon atoms which may contain an unsaturated bond and/or an aromatic ring; A may contain two or more

cyclic structures including a ring formed by A in cooperation with Y; Y is a carbon atom or a silicon atom; M is a metal selected from Group 4 of the periodic table; j is an integer of 1 to 4; Q is selected from a halogen atom, a hydrocarbon group, an anionic ligand and a neutral ligand capable of coordination by a lone pair; and when j is 2 or greater, each Q may be the same or different.

2. A metallocene compound represented by the following formula (1a) or (2a):



...(1a)

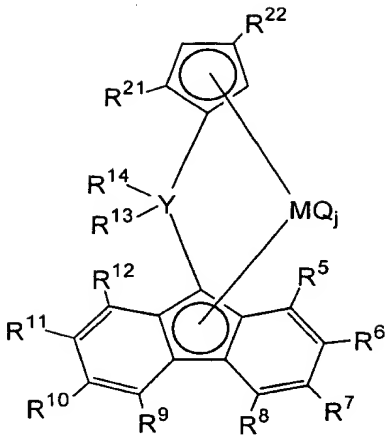


...(2a)

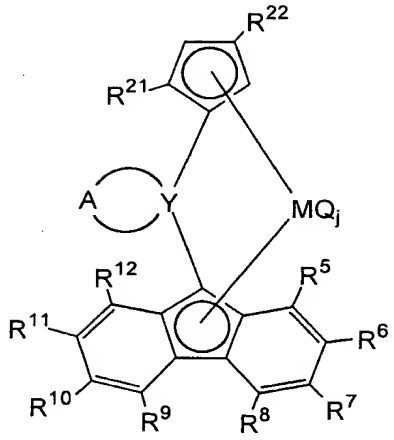
wherein R^3 is selected from a hydrocarbon group and a silicon-containing hydrocarbon group; R^1, R^2, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13} and R^{14} may be the same or different and are each selected from a

hydrogen atom, a hydrocarbon group and a silicon-containing hydrocarbon group; in case of a compound of the formula (1a), when R^3 is a tert-butyl group or a trimethylsilyl group and when R^{13} and R^{14} are methyl groups or phenyl groups at the same time, R^6 and R^{11} are not hydrogen atoms at the same time; of the groups indicated by R^1 to R^{12}, neighboring groups may be bonded to form a ring; in case of the formula (1a), a group selected from R^1, R^4, R^5 and R^{12} may be bonded to R^{13} or R^{14} to form a ring; A is a divalent hydrocarbon group of 2 to 20 carbon atoms which may contain an unsaturated bond and/or an aromatic ring; A may contain two or more cyclic structures including a ring formed by A in cooperation with Y; Y is a carbon atom or a silicon atom; M is a metal selected from Group 4 of the periodic table; j is an integer of 1 to 4; Q is selected from a halogen atom, a hydrocarbon group, an anionic ligand and a neutral ligand capable of coordination by a lone pair; and when j is 2 or greater, each Q may be the same or different.

3. A metallocene compound represented by the following formula (1b) or (2b):



...(1b)

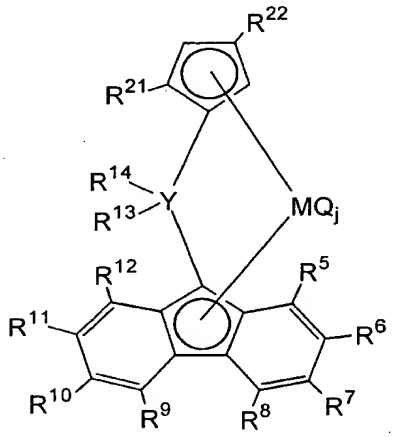


...(2b)

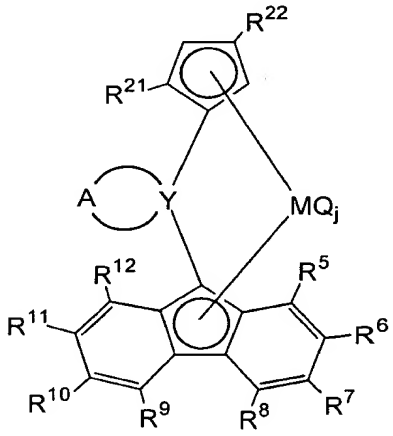
wherein R^{21} and R^{22} may be the same or different and are each selected from a hydrocarbon group and a silicon-containing hydrocarbon group; R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13} and R^{14} may be the same or different and are each selected from a hydrogen atom, a hydrocarbon group and a silicon-containing hydrocarbon group; of the groups indicated by R^5 to R^{12}, neighboring groups may be bonded to form a ring; A is a divalent hydrocarbon group of 2 to 20 carbon atoms which may contain an unsaturated bond and/or an aromatic ring; A may contain two or more cyclic structures including a ring formed by A in cooperation with Y; M is a metal selected from Group 4 of the periodic table; Y is a carbon atom or a silicon atom; j is an integer of 1 to 4; Q is selected from a

halogen atom, a hydrocarbon group, an anionic ligand and a neutral ligand capable of coordination by a lone pair; and when j is 2 or greater, each Q may be the same or different.

4. A process for preparing a metallocene compound, comprising selectively preparing a metallocene compound represented by the following formula (1b) or (2b) so as not to include an isomeric compound represented by the following formula (3b), (4b), (5b) or (6b);



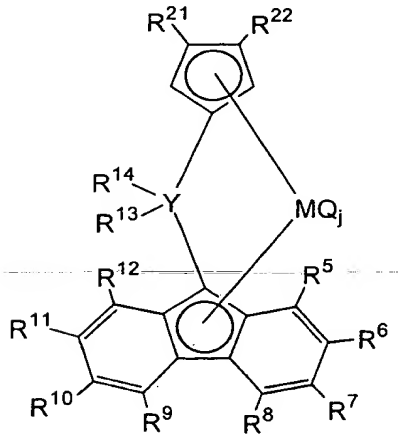
...(1b)



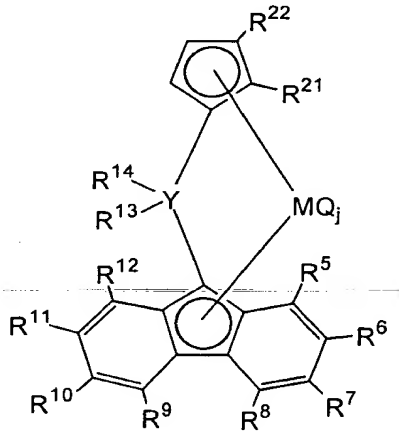
...(2b)

wherein R^{21} and R^{22} may be the same or different and are each selected from a hydrocarbon group and a silicon-containing hydrocarbon group; R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{12}, R^{13} and R^{14} may be the same or

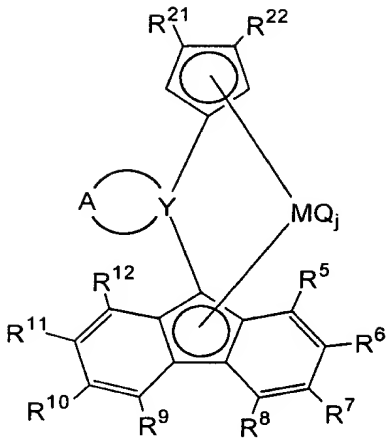
different and are each selected from a hydrogen atom, a hydrocarbon group and a silicon-containing hydrocarbon group; of the groups indicated by R^5 to R^{12}, neighboring groups may be bonded to form a ring; A is a divalent hydrocarbon group of 2 to 20 carbon atoms which may contain an unsaturated bond and/or an aromatic ring; A may contain two or more cyclic structures including a ring formed by A in cooperation with Y; M is a metal selected from Group 4 of the periodic table; Y is a carbon atom or a silicon atom; j is an integer of 1 to 4; Q is selected from a halogen atom, a hydrocarbon group, an anionic ligand and a neutral ligand capable of coordination by a lone pair; and when j is 2 or greater, each Q may be the same or different;



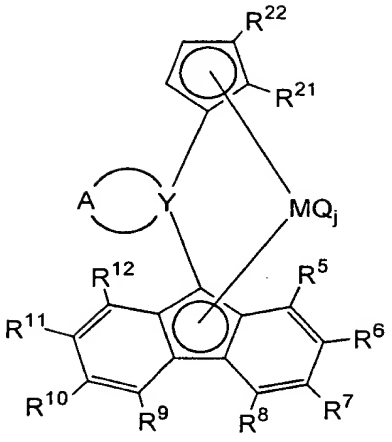
...(3b)



...(4b)



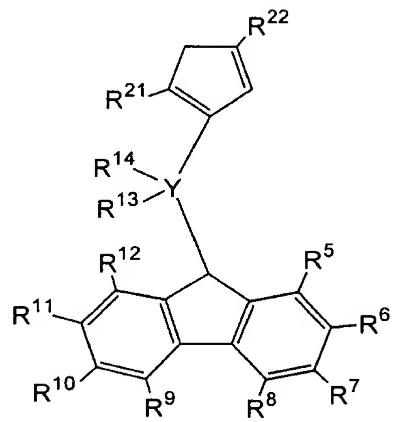
...(5b)



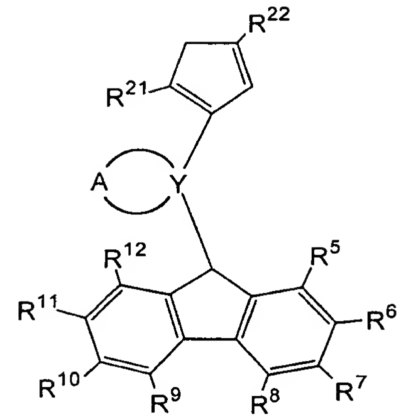
...(6b)

wherein R^{21}, R^{22}, R^5 to R^{14}, A, M, Y, Q and j have the same meanings as those of R^{21}, R^{22}, R^5 to R^{14}, A, M, Y, Q and j in the formula (1b) or (2b), respectively.

5. The process for preparing a metallocene compound as claimed in claim 4, wherein a ligand precursor represented by the following formula (7b) or (8b) is selectively prepared so as not to include an isomeric compound represented by the following formula (9b), (10b), (11b) or (12b), and the resulting ligand precursor is used as a material to selectively prepare the metallocene compound represented by the formula (1b) or (2b);

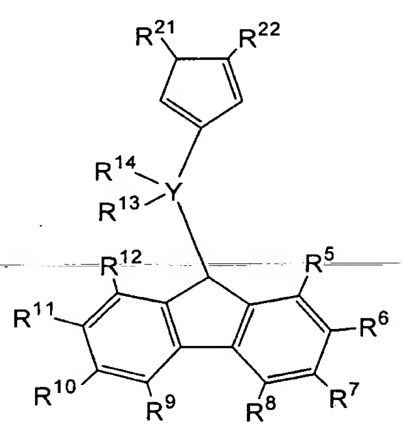


...(7b)

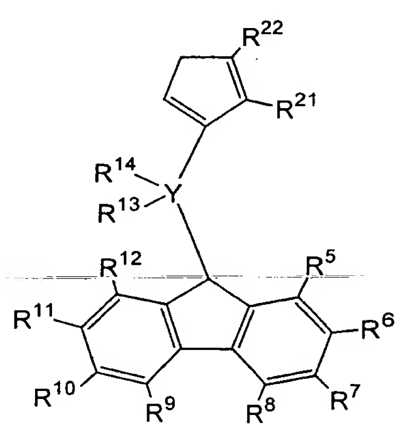


...(8b)

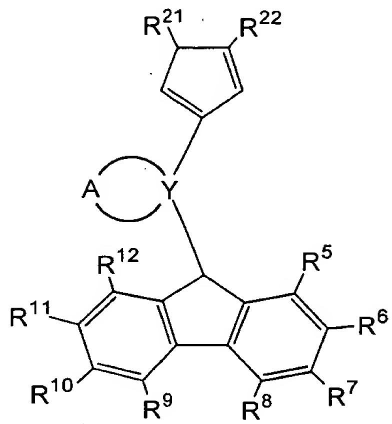
wherein R^{21}, R^{22}, R^5 to R^{14}, A and Y have the same meanings as those of R^{21}, R^{22}, R^5 to R^{14}, A and Y in the formula (1b) or (2b), respectively; and the cyclopentadienyl group may be another isomer different in only the position of a double bond in the cyclopentadienyl ring or a mixture thereof;



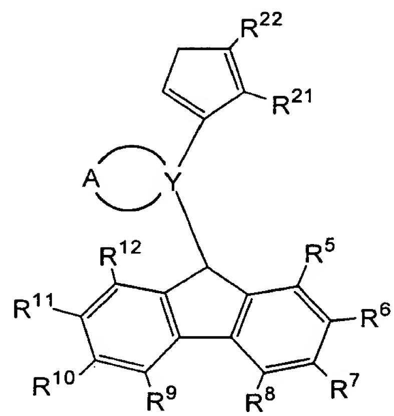
...(9b)



...(10b)



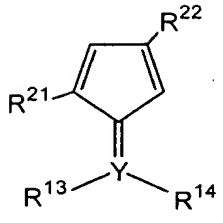
...(11b)



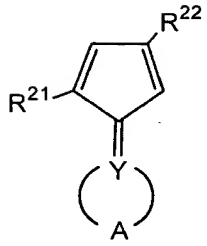
...(12b)

wherein R^{21}, R^{22}, R^5 to R^{14}, A and Y have the same meanings as those of R^{21}, R^{22}, R^5 to R^{14}, A and Y in the formula (1b) or (2b), respectively; and the cyclopentadienyl group may be another isomer different in only the position of a double bond in the cyclopentadienyl ring or a mixture thereof.

6. A process for preparing a metallocene compound as claimed in claim 5, wherein a precursor compound represented by the following formula (13b) or (14b) is selectively prepared so as not to include an isomeric compound represented by the following formula (15b), (16b), (17b) or (18b), and the resulting precursor compound is used as a material to selectively prepare the ligand precursor represented by the formula (7b) or (7b);

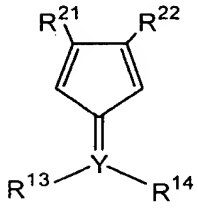


...(13b)

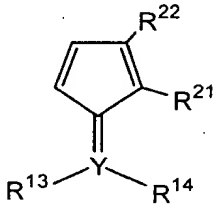


...(14b)

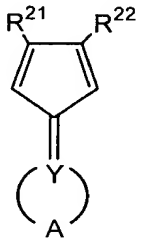
wherein R^{21}, R^{22}, R^{13}, R^{14}, Y and A have the same meanings as those of R^{21}, R^{22}, R^{13}, R^{14}, Y and A in the formula (1b) or (2b), respectively;



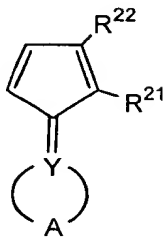
(15a)



(16b)



(17b)

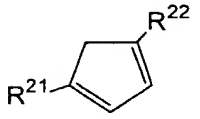


(18b)

wherein R^{21}, R^{22}, R^{13}, R^{14}, Y and A have the same meanings as those of R^{21}, R^{22}, R^{13}, R^{14}, Y and A in the formula (1b) or (2b), respectively.

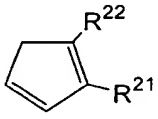
7. A process for preparing a metallocene compound as claimed in claim 6, wherein cyclopentadiene represented by the following formula (19b) is selectively prepared so as not to include an isomeric compound represented by the following formula

(20b), and the resulting cyclopentadiene is used as a material to selectively prepare the precursor compound represented by the formula (13b) or (14b);



...(19b)

wherein R^{21} and R^{22} have the same meanings as those of R^{21} and R^{22} in the formula (1b) or (2b), respectively; and the cyclopentadienyl group may be another isomer different in only the position of a double bond in the cyclopentadienyl ring or a mixture thereof;



...(20b)

wherein R^{21} and R^{22} have the same meanings as those of R^{21} and R^{22} in the formula (1b) or (2b), respectively; and the cyclopentadienyl group may be another isomer different in only the position of a double bond in the cyclopentadienyl ring or a mixture thereof.

8. An olefin polymerization catalyst comprising the metallocene compound of any one of claims 1 to 3.

9. An olefin polymerization catalyst comprising:

(A) the metallocene compound of any one of claims 1 to 3, and

(B) at least one compound selected from:

(B-1) an organometallic compound,

(B-2) an organoaluminum oxy-compound, and

(B-3) a compound which reacts with the metallocene compound (A) to form an ion pair.

10. An olefin polymerization catalyst comprising the olefin polymerization catalyst of claim 9 and (C) a particle carrier.

11. A process for preparing a polyolefin, comprising polymerizing or copolymerizing an olefin in the presence of the olefin polymerization catalyst of any one of claims 8 to 10.

12. The process for preparing a polyolefin as claimed in claim 11, wherein the metallocene compound (A) is the metallocene compound represented by the formula (1) or (2), and at least 2 kinds of olefins are copolymerized.

13. The process for preparing a polyolefin as claimed in claim 11, wherein the metallocene compound (A) is the metallocene compound represented by the formula (1a) or (2a), and a single olefin is polymerized.

14. A polyolefin which comprises recurring units (U_1) derived from one α-olefin selected from α-olefins of 3 to 8 carbon atoms in amounts of 50 to 100 % by mol and recurring units (U_2) other than the recurring units (U_1), said recurring units (U_2) being derived from at least one olefin selected from α-olefins of 2 to 20 carbon atoms, in amounts of 50 to 0 % by mol, and has the following properties:

(i) the proportion of 2,1-insertion and the proportion of 1,3-insertion are each not more than 0.2 %,

(ii) the molecular weight distribution (Mw/Mn) as determined by gel permeation chromatography is in the range of 1 to 3, and

(iii) the quantity of a decane-soluble component is not more than 2 % by weight.

15. The polyolefin as claimed in claim 14, which comprises recurring units derived from propylene in

amounts of 50 to 99.5 % by mol and recurring units derived from at least one olefin selected from α-olefins of 2 to 20 carbon atoms other than propylene in amounts of 50 to 0.5 % by mol.

16. A polyolefin which is a homopolymer of one α-olefin selected from α-olefins of 3 to 8 carbon atoms and has the following properties:

(i) the pentad isotacticity as determined from ^{13}C-NMR spectrum measurement is not less than 85 %,

(ii) the proportion of 2,1-insertion and the proportion of 1,3-insertion are each not more than 0.2 %,

(iii) the melt flow rate (measured at 230°C under a load of 2.16 kg in accordance with ASTM D1238) is in the range of 0.01 to 1000 g/10 min,

(iv) the molecular weight distribution (Mw/Mn) as determined by gel permeation chromatography is in the range of 1 to 3,

(v) the quantity of a decane-soluble component is not more than 2 % by weight, and

(vi) the melting point (Tm) as measured by a differential scanning calorimeter is not lower than 140°C.

17. The polyolefin as claimed in claim 16, which is a homopolymer of propylene.

18. A polyolefin which comprises recurring units (U_1) derived from one α-olefin selected from α-olefins of 3 to 8 carbon atoms in amounts of 95 to 99.5 % by mol and recurring units (U_2) other than the recurring units (U_1), said recurring units (U_2) being derived from at least one olefin selected from α-olefins of 2 to 20 carbon atoms, in amounts of 5 to 0.05 % by mol, and has the following properties:

(i) the pentad isotacticity as determined from ^{13}C-NMR spectrum measurement is not less than 80 %,

(ii) the proportion of 2,1-insertion and the proportion of 1,3-insertion are each not more than 0.2 %,

(iii) the melt flow rate (measured at 230°C under a load of 2.16 kg in accordance with ASTM D1238) is in the range of 0.01 to 1000 g/10 min,

(iv) the molecular weight distribution (Mw/Mn) as determined by gel permeation chromatography is in the range of 1 to 3,

(v) the quantity of a decane-soluble component is not more than 2 % by weight, and

(vi) the melting point (Tm) as measured by a differential scanning calorimeter is not higher than 145°C.

19. The polyolefin as claimed in claim 18, which comprises recurring units derived from propylene in amounts of 95 to 99.5 % by mol and recurring units derived from at least one olefin selected from α-olefins of 2 to 20 carbon atoms other than propylene in amounts of 5 to 0.5 % by mol.

Add A1